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Record of the invasive alien ladybird *Harmonia axyridis* (Coleoptera, Coccinellidae) from Kenya

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Abstract

The biological control agent and alien invasive ladybird *Harmonia axyridis* (Pallas, 1773) was recorded for the first time in Kenya, and in equatorial Africa, in 2010.

Keywords

Multicolored Asian Ladybird, distribution, new record, Kenya, Afrotropical region, invasive predator

Introduction

The multicolored Asian lady beetle or harlequin ladybird *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae) is native to temperate (and mountain subtropical) Central and East Asia: China, Taiwan, Japan, Korea, Mongolia, Kazakhstan and eastern Russia (Kuznetsov 1992). It was introduced in many regions of the world as a biological control agent against aphids, and later became an invasive species, spreading 100–500

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km each year. It is established in at least 37 countries in four continents (Brown et al. in press). In Africa, this species was intentionally introduced in two Mediterranean countries: Tunisia, where it did not survive, and Egypt (Ferran et al. 2000), where it established a limited population (Brown et al. in press). Conversely, it has invaded and established in South Africa (Stals and Prinsloo 2007) and neighbouring Lesotho (Stals 2010) although it was not intentionally introduced there.

This article reports the first record of this alien invasive ladybird beetle in Kenya.

Material examined

Kenya E, Coast province, Kikambala (3° 48.28'S; 39° 50.00'E; cca. 45 km N of Mombasa), 30.12.2010–8.1.2011, 2 ♀♀ lgt. + 20 exx. observ., Jiří Háva & Daniela Kulíková lgt., J. Háva coll. et det.

We observed the beetles on the plant *Ipomoea pescapre* (Convolvulaceae) on the sea coast (Fig. 1). All individuals belonged to the colour morph *succinea* (Hope), with 19 well-developed spots on the elytra and well-developed elytral ridges (Fig. 2). Like a previous record of *H. axyridis* in Uruguay (Nedvěd and Krejčík 2010), this finding was done by chance by a non-professional entomologist.

Figure 1. The host plant *Ipomoea pescapre* (Convolvulaceae) on the sea coast in Kikambala.

Figure 2. Female of *Harmonia axyridis* from Kikambala, colour morph *succinea*, with 19 spots and elytral ridge.

Discussion

Because Kikambala is a holiday centre, but not a port or transport node, we consider the occurrence of *H. axyridis* here to be the result of a wider and lasting invasion, rather than a singular incidental and ephemeral introduction with goods.

The observed colour morph *succinea* is the most common morph in the eastern part of its natural range (Blekhman et al. 2010) and in the invasive European population (Brown et al. 2008). The size of the spots suggests that the individuals recorded emerged from pupae at temperatures of around 25°C – the spots would be smaller or missing at higher temperatures (Michie et al. 2010).

High temperature may be limiting the continued spread of *H. axyridis*, at least at a local scale. The American (Acar et al. 2001) and European (Fois et al., unpublished) invasive populations do not survive temperatures above 33°C. However, the CLIMEX model that used known physiological limits of *H. axyridis* indicated that this species may tolerate most southern and eastern African countries, including Kenya (Poutsma et al. 2008). The coastal climate near Mombasa is rather hot (average annual temperature 26°C, Climate & Temperature 2011), while at higher elevations inland, mild temperatures (*e.g.* 18°C in the capital, Nairobi) are more favourable for *H. axyridis*.

Although there were several independent introductions of *H. axyridis* in Europe and North America, with different source populations from East Asia, there is a single main invasive population/strain in several continents (Lombaert et al. 2010). Thus in future the origin of the population in Kenya should be compared with known populations from both the native and invasive ranges, using molecular genetic methods (Blekhman et al. 2010, Thomas et al. 2010, Lawson Handley et al., in press) to determine if it is the same strain, or a different one that might have higher temperature requirements.

Conclusion

We consider that *H. axyridis* has established in Kenya, the first fully tropical country to be invaded, but that its further spread may be hampered by high temperature and low prey availability. In this region we suggest that *H. axyridis* may pose a low threat to biodiversity, such as the native ladybird beetles, which are mostly coccidophagous.

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References

Acar B, Smith BN, Hansen LD, Booth GM (2001) Calorespirometry to determine the effects of temperature on the metabolic efficiency of *Harmonia axyridis* (Col.: Coccinellidae) larvae. http://esa.confex.com/esa/2001/techprogram/paper_3292.htm [accessed 10 Feb 2011]

Blekhman AV, Goryacheva II, Zakharov IA (2010) Differentiation of *Harmonia axyridis* Pall. according to polymorphic morphological traits and variability of the mitochondrial COI gene. Moscow University Biological Sciences Bulletin 65: 174–176. doi:10.3103/S0096392510040140

Brown PMJ, Adriaens T, Bathon H, Cuppen J, Goldarazena A, Hagg T, Kenis M, Klausnitzer BEM, Kovar I, Loomans AJM, Majerus MEN, Nedved O, Pedersen J, Rabitsch W, Roy HE, Ternois V, Zakharov IA, Roy DB (2008) *Harmonia axyridis* in Europe: spread and distribution of a non-native coccinellid. BioControl 53: 5–21. doi: 10.1007/s10526-007-9132-y

Brown PMJ, Thomas CE, Lombaert E, Jeffries DL, Estoup A, Lawson Handley LJ (in press) The global spread of *Harmonia axyridis* (Coleoptera: Coccinellidae): distribution, dispersal and routes of invasion. BioControl.

Climate & Temperature: http://www.climatetemp.info/kenya/mombasa.html [accessed 6 Mar 2011]

Ferran A, El-Arnaouty SA, Beyssat-Arnaouty V, Galal H (2000) Introduction and release of the coccinellid *Harmonia axyridis* Pallas for controlling *Aphis craccivora* Koch on faba beans in Egypt. Egyptian Journal of Biological Pest Control 10: 129–136.

Kuznetsov VN (1992) Family Coccinellidae – ladybirds. In: Lera PA (Ed) Identification key to insects of Far East of Soviet Union III, 2. Nauka, 333–376. [In Russian]

Lawson Handley LJ, Estoup A, Thomas C, Lombaert E, Facon B, Aebi A, Evans D, Roy HE (in press) Ecological genetics of invasive species. BioControl.

Lombaert E, Guillemaud T, Cornuet JM, Malausa T, Facon B, Estoup A (2010) Bridgehead effect in the worldwide invasion of the biocontrol harlequin ladybird. Plos One 5: e9743. doi:10.1371/journal.pone.0009743

Michie LJ, Mallard F, Majerus MEN, Jiggins FM (2010) Melanic through nature or nurture: genetic polymorphism and phenotypic plasticity in *Harmonia axyridis*. Journal of Evolutionary Biology 23: 1699–1707. doi: 10.1111/j.1420-9101.2010.02043.x

Nedvěd O, Krejčík S (2010) Record of the ladybird *Harmonia axyridis* (Coleoptera: Coccinellidae) from Uruguay. Klapalekiana 46: 203–204.

Poutsma J, Loomans AJM, Aukema B, Heijerman T (2008) Predicting the potential geographical distribution of the harlequin ladybird, *Harmonia axyridis*, using the CLIMEX model. BioControl 53:103–125. doi: 10.1007/s10526-007-9140-y

Stals R (2010) The establishment and rapid spread of an alien invasive lady beetle: *Harmonia axyridis* (Coleoptera: Coccinellidae) in southern Africa, 2001-2009. IOBC WPRS Bulletin 58: 125–132. http://www.iobc-wprs.org/restricted_member/iobc-wprs_bulletin_2010_58.pdf

Stals R, Prinsloo G (2007) Discovery of an alien invasive, predatory insect in South Africa: the multicoloured Asian ladybird beetle, *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae). South African Journal of Science 103: 123–126.

Thomas C, Lombaert E, Ware RL, Estoup A, Lawson Handley LJ (2010) Investigating global invasion routes of the harlequin ladybird (*Harmonia axyridis*) using mtDNA. IOBC WPRS Bulletin 58:155–157. http://www.iobc-wprs.org/restricted_member/iobc-wprs_bulletin_2010_58.pdf